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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

ADVISORY ACTION

Response to Amendment

This is in response to the Amendment After Final dated March 9, 2010. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office Action.

Response to Arguments

Election/Restrictions

This application contains claims **7 and 8** drawn to an invention nonelected without traverse in the reply filed on May 7, 2009.

Claim Objections

Claim **19** has been objected to because of minor informalities.

The objection of claim 19 has been withdrawn in view of Applicants' amendment. Claim 19 has been cancelled.

Claim Rejections - 35 USC § 112

Claim **20** has been rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The rejection of claim 20 under 35 U.S.C. 112, first paragraph, has been withdrawn in view of Applicants' amendment. Claim 20 has been cancelled.

Claim Rejections - 35 USC § 103

Claims **1-6 and 9-20** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **Yudasaka et al.** ("Diameter-Selective Removal of Single-Wall Carbon Nanotubes Through Light-Assisted Oxidation", Chemical Physics Letters (June 4, 2003), Vol. 374, Issues 1-2, pp. 132-136) in view of **Bokova et al.** ("Laser-Induced Effects in Raman Spectra of Single-Wall Carbon Nanotubes", Quantum Electronics (July 31, 2003), Vol. 33, No. 7, pp. 645-650), **Irle et al.** ("Theoretical Study of Structure and Raman Spectra for Models of Carbon Nanotubes in Their Pristine and Oxidized Forms", J. Phys. Chem. A (2002), Vol. 106, pp. 11973-11980), and **Howard et al.** (US Patent No. 7,396,520 B2).

With regards to claims ***19 and 20***, the rejection under 35 U.S.C. 103(a) as being unpatentable over Yudasaka et al. in view of Bokova et al., Irle et al. and Howard et al. has been withdrawn in view of Applicants' amendment. Claims 19 and 20 have been cancelled.

With regards to claims ***1-6 and 9-18***, the rejection under 35 U.S.C. 103(a) as being unpatentable over Yudasaka et al. in view of Bokova et al., Irle et al., and Howard et al. is as applied in the Office Action dated December 10, 2009 and incorporated herein. The rejection has been maintained for the following reasons:

Applicants state that although Howard discloses various oxidants (e.g., "pure O_2"), it should be noted that the oxidants are taught with regard to "fullerenes synthesis" (as opposed to fullerene removal). Because the removal of single-walled carbon nanotubes as taught by Yudasaka is the complete opposite of the synthesis of fullerenes (e.g., single-walled carbon nanotubes) as taught by Howard, *there is no credible reason why one of ordinary skill in the art would have been motivated to modify the nanotube removal method of Yudasaka so as to more resemble the nanotube synthesis method of Howard*.

In response, Howard teaches:

"Oxidant" as it is used here refers to the oxidizing agent fed to the combustor. Once in the combustor the oxidant can be assumed either to participate directly, i.e., as a reactant, in oxidation reactions or it may be converted to other oxidizing species which in turn participate as reactants in oxidation reactions. The most preferred oxidant in fullerenes synthesis by combustion is molecular oxygen or O_2, ***which may be fed*** as pure O_2, ***as air***, as O_2 mixed with one or more inert gases, as O_2-enriched air, as air partially depleted of its original nitrogen, or in other mixtures. The O_2 may serve as the oxidizing reactant in the combustor or it may be converted to some extent to OH, O, HO_2 , H_2O, CO_2, or other oxygen-containing species ***which in turn serve as reactants in oxidation reactions***. Other oxidants of some interest under certain conditions as feeds for a fullerenes synthesis combustor are ***hydrogen peroxide (H_2O_2)***, ozone (O_2), and mixtures of these with an inert gas and/or one or more of the species OH, O, HO_2, H_2O, CO_2, or other oxygen-containing radicals or stable molecules (col. 6, line 56 to col. 7, line 7).

But there is motivation to substitute one oxidant for another. It has been held that the selection of a known material based on its suitability for its intended use supports a *prima facie* obviousness determination (MPEP § 2144.06 and § 2144.07).

There is no evidence that substituting the H_2O_2 solution disclosed by

Yudasaka with the air disclosed by Howard would have not accomplished what Yudasaka wants to do. Howard teaches that *air and hydrogen peroxide (H_2O_2) are both oxidants which serve as reactants in oxidation reactions*. Thus, according to the teachings of Howard, air and hydrogen peroxide (H_2O_2) would have possessed similar abilities.

Furthermore, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Furthermore, a reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering the problem (MPEP 2141.01(a)).

Applicants state that the combination of Yudasaka, Bokova, Irle, and Howard also fails to disclose or suggest a method of structure control involving "irradiating the mixture of nano-scale low-dimensional quantum structures of differing densities of states with an electromagnetic wave in air for two hours," as recited by amended claim 1. Rather, Yudasaka explicitly states that when the irradiation lasted "longer than 5 min, diameter-selective removal through light

irradiation was not apparent." Thus, *it is clear that Yudasaka actually teaches away from Applicants' claimed irradiation period*.

In response, Yudasaka never said that the irradiating of a mixture of nano-scale low-dimensional quantum structures of differing densities of states with an electromagnetic wave in an atmosphere cannot be for two hours. The disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments (MPEP § 2123 (II)).

Yudasaka teaches that light irradiation enhanced the oxidation and removal of SWNTs (page 135, "4. Discussion"). The Examiner maintains that the irradiation time is a result-effective variable and one having ordinary skill in the art has the skill to calculate the radiation time that would have determined the success of the desired reaction to occur, i.e., the oxidation and removal of SWNTs (MPEP § 2141.03 and § 2144.05(11)(B)).

One having ordinary skill in the art would have reasonably expected that irradiating the SWNTs for two hours would have oxidized and removed more SWNTs than irradiating the SWNTs for thirty minutes. It would have also depended on how much SWNTs one having ordinary skill in the art has to irradiate (as in scaling up or scaling down the conditions for a particular circumstance).

Applicants state that although Bokova discloses various energy densities, the method of Bokova and that of claim 1 *fundamentally differ in principle*. In

particular, the method of Bokova was *not designed* to have any relation to the density of states of carbon nanotubes.

In response, Bokova teaches that the selective resonance response of nanotubes can be tuned not only by scanning the laser excitation frequency but also by varying the laser power density (the laser wavelength being fixed) [page 648. left column, lines 34-37].

The reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by the Applicants. *In re Linter* 458 F.2d 1013, 173 USPQ 560 (CCPA 1972); *In re Dillon* 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990), *cert. denied*, 500 US 904 (1991); and MPEP § 2144.

Applicants state that the method of Yudasaka lacks the selectivity of claim 1, as evidenced by the inability of the method of Yudasaka to remove metallic carbon nanotubes.

In response, there is no claim basis in the present claims for removing metallic carbon nanotubes. It is well settled that unpatented claims are given the broadest, most reasonable interpretation and that limitations are not read into the claims without a proper claim basis therefor. *In re Prater* 415 F. 2d 1393, 162 USPQ 541 (CCPA 1969); *In re Zeltz* 893 F. 2d 319, 13 USPQ 1320.

Furthermore, the inoperativeness of a reference is not established by

merely showing that a particular disclosed embodiment is lacking in perfection does not establish non-obviousness. *Ex parte Allen* 2 USPQ 2d 1425 (BPAI 19870; *Decca Ltd. V. United States* 191 USPQ 439 (Ct. Cl. 1976); *Bennett v. Halahan* 128 USPQ 398, 401 (CCPA 1961).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDNA WONG whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Edna Wong/
Primary Examiner
Art Unit 1795

EW
March 19, 2010